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Serial Number
09686304

Date Mailed
5/18/05

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Notice of Allowance Mailed

This application has been accorded an Allowance Date and is being prepared for issuance. The application, however, is incomplete for the reasons below.

Applicant is given 30 days from the mail date of this Notice within which to correct the informalities indicated below. A failure to reply will result in the application being ABANDONED. This period for reply is NOT extendable under 37 CFR 1.136 (a) or (b).

- Pages 25 and 32 are missing from the specification.

APPLICANT MUST SUPPLY MISSING INFORMATION WITHIN 30 DAYS OF THE MAIL DATE OF THIS NOTICE.

A copy of this notice MUST be returned with the reply. Please address response to "Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313"

Rori Burch

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JPW/2631

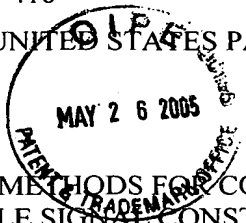
Attorney Docket No. 8194-416

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re: Paul W. Dent
Serial No.: 09/686,304
Filed: October 11, 2000

Group Art Unit: 2631
Examiner: Emmanuel Bayard
Confirmation No.: 5164
For: SYSTEMS AND METHODS FOR COMMUNICATING SPREAD SPECTRUM SIGNALS
USING VARIABLE SIGNAL CONSTELLATIONS



Date: May 24, 2005

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO NOTICE TO FILE CORRECTED APPLICATION PAPERS

Sir:

In response to the Notice to File Corrected Application Papers-Notice of Allowance Mailed, mailed May 18, 2004 regarding the above-referenced patent application, there is enclosed herewith are replacement page 25 and 32 from the specification. It is requested that these substitute pages of the specification be substituted for the originally filed specification. No substantive changes have been made to the original specification. Rather, substitute page 25 deletes reference to an application that was expected to be filed, but was not, and substitute page 32 updates the text where a patent has issued. Pursuant to 37 CFR 1.125(b)(1), Applicants hereby state that the substitute specification contains no new matter.

If any extension of time for the accompanying response or submission is required, Applicants requests that this be considered a petition therefor. The Commissioner is hereby authorized to charge any deficiency, or credit any refund, to our Deposit Account No. 50-0220.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Robert M. Meeks".

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Certificate of Mailing under 37 CFR 1.8 (or 1.10)

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on May 24, 2005.

A handwritten signature in black ink, appearing to read "Candi L. Riggs".
Candi L. Riggs

determine the most likely quantization of the M-ary symbols, although the latter can be obtained by back-substituting the former if required.

When transmission takes place using M-ary symbols each conveying a plurality of $N=\log_2(M)$ of binary information bits, there are ways to encode binary information and then to map the coded bits to M-ary symbols, known in the art as Trellis Coding. Conventionally, Trellis coding typically comprises the limitation that successive coded bits to emerge from the error correction coder filled one multi-bit symbol before filling the next multibit symbol, *i.e.*, no bit-interleaving prior to bit-to-symbol mapping is used. In conventional Trellis coding, symbols could in principle be time-interleaved after bit-to-symbol mapping. One purpose of interleaving is to disperse the error correction coder output symbols or bits to segments of the transmission far apart in time, and therefore unlikely to be all corrupted at the same time by a signal fade. The use of such symbol interleaving, although theoretically permitted in conventional Trellis Coding, is generally more difficult to use when transmitting non-CDMA signals through a multipath channel liable to cause intersymbol interference (ISI). Generally, in such conventional Trellis Coding applications, it is more desirable that successive symbols out of the Trellis encoder be transmitted sequentially, so that ISI between adjacent symbols may be treated as part of the encoding process and compensated in a decoder of slightly more complexity.

In contrast, when using M-ary signaling in a spread-spectrum system according to embodiments of the present invention, the ISI occurs not between adjacent M-ary symbols, but between adjacent CDMA chips, and may be compensated by the use of a RAKE processor. Consequently, there may be no need to increase decoder complexity when Trellis-coded symbols are interleaved to non-adjacent segments of the transmitted signal.

parity bits are then mapped to $M1/N$ symbols using any interleaving or grouping method. A second, Trellis coder then runs down columns, generating $M+M2$ bits which are mapped to $(M+M2)/N$ symbols by the Trellis code. The exact choice of coding and decoding methods described above are not material to this invention; however, higher performance coding techniques are generally more desirable. For more information on turbo codes and decoders, reference is made to IEEE Journal On Selected Areas In Communications, Volume 16 No. 2, 1998.

A turbo decoder usually receives soft bit information, *e.g.* from a RAKE combiner, and then interactively refines probability estimates for the bits to obtain a most likely set of information bits that would best explain the observed soft bit information. These probability estimates are referred to as Maximum A-posteriori Probabilities or MAP values. One approach to the decoding of multi-bit symbols is to convert the complex numbers output by the RAKE combiner to bitwise soft information for the coded bits, and then to perform turbo-processing of the coded bit soft information to produce the most likely decoding of the information bits.

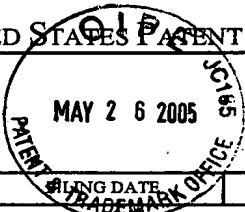
An potential improvement to the above, however, comprises recomputing the transformation between complex number outputs of the RAKE combiner and soft coded bit likelihoods by feeding back partially decoded values of the other $N-1$ bits per symbol when refining the soft information for the N th bit. Such an approach is described in United States Patent Number 6,697,441, entitled "BASEBAND PROCESSORS AND METHODS AND SYSTEMS FOR DECODING A RECEIVED SIGNAL HAVING A TRANSMITTER OR CHANNEL INDUCED COUPLING BETWEEN BITS", filed June 6, 2000 and incorporated herein by reference in its entirety.

FIG. 8 illustrates a communications system **800** according to embodiments of the present invention, in particular, components as may be used to generate signals for transmission from a network station of a cellular wireless or other type of communications network. The communications system **800** includes an error correction encoder **810**, a variable symbol generator **820**, a spreader **830**, a transmitter **840**, and a controller **850**. The error correction encoder **810** encodes an input



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| 09/686,304 | 10/11/2000 | Paul W. Dent | 8194-416/P11717-US1 | 5164 |

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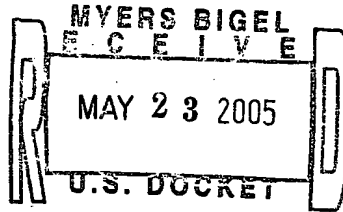
EXAMINER

BAYARD, EMMANUEL

ART UNIT PAPER NUMBER

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